Nota lepid. 22 (2): 82–114; 15.VI.1999 ISSN 0342–7536

Revision of the south-western Palaearctic species of *Synansphecia* (Sesiidae)

Axel Kallies

Plöner Str. 13, D-19057 Schwerin
e-mail: kallies@fmp-berlin.de

Summary. The type specimens of *Synansphecia atlantis* (Schwingenschuss, 1935), *S. borreyi* (Le Cerf, 1922), *S. powelli* (Le Cerf, 1916) and *S. aistleitneri* Špatenka, 1992 have been studied and the species are revised and redescribed in detail. The taxon *powelli* is transferred back to *Chamaesphecia*, its original combination. Two new species, *S. hispanica* sp. n. and *S. maroccana* sp. n., are described from Spain and from Morocco, respectively. A key to the Palaearctic species of the *S. triannuliformis* and *S. muscaeformis* group is presented. *S. atlantis* is known only from the High Atlas Mts in Morocco from altitudes between 2000 and 2900 m. Its host plant is supposed to be an *Armeria* species (Plumbaginaceae). It is closely related and similar to *S. borreyi* and *S. koschwitzi*. *S. borreyi* is known from different localities in Morocco from about 400 m up to 2200 m. Host plants are *Limonium* species (Plumbaginaceae). *S. hispanica* sp. n. is represented in many collections but usually has been confused with *S. atlantis*. It is widely distributed in Spain and is also found in southern France. It occurs from the coastline up to more than 2000 m in the Sierra Nevada. It is closely related to *S. maroccana* sp. n. and *S. triannuliformis* (Freyer, 1845). The host plants are various *Rumex* species (Polygonaceae). *S. maroccana* sp. n. is widely distributed in the Atlas Mts in Morocco and found at altitudes between 1600 and 2700 m. The host plant is a *Rumex* species (Polygonaceae). *Chamaesphecia powelli* comb. rev. was known for certain from the type locality in Algeria only. Recently, it has also been found in the High Atlas Mts in Morocco. It was reared from the roots of a *Nepeta* species (Lamiaceae). Additionally, *S. affinis erodiiphaga* (Dumont, 1922) is recorded from Morocco and southern Spain for the first time.

Zusammenfassung. Das Typenmaterial von *Synansphecia atlantis* (Schwingenschuss, 1935), *S. borreyi* (Le Cerf, 1922), *S. powelli* (Le Cerf, 1916) und *S. aistleitneri* Špatenka, 1992 wurde untersucht, die Arten werden revidiert und detailliert beschrieben. Das Taxon *powelli* wird der Gattung *Chamaesphecia* zugeordnet, die Orginalkombination wird damit revitalisiert. *S. hispanica* sp. n. und *S. maroccana* sp. n. werden aus Spanien bzw. aus Marokko beschrieben. Ein Bestimmungsschlüssel für die Arten der *Synansphecia triannuliformis*- und *S. muscaeformis*-Gruppe wird vorgelegt. *S. atlantis* ist aus dem Hohen Atlas in Marokko aus Höhenlagen von 2000 bis 2900 m bekannt. Vermutlich ist die Futterpflanze eine *Armeria* sp. (Plumbaginaceae). Die Art ist nahe verwandt mit *S. borreyi* und *S. koschwitzi* und ähnelt beiden Arten. *S. borreyi* ist von einer Reihe von Lokalitäten in Marokko, aus Höhenlagen von 400–2200 m, bekannt. Futterpflanzen sind verschiedene *Limonium*-Arten (Plumbaginaceae).

S. hispanica sp. n. ist in zahlreichen Sammlungen vertreten, wurde jedoch meistens mit *S. atlantis* verwechselt. Die Art ist in Spanien weit verbreitet, wird aber auch in Südfrankreich gefunden. Sie kommt von der Küste bis in eine Höhe von mehr als 2000 m in der Sierra Nevada vor. Die Art ist nahe verwandt mit *S. maroccana* sp. n. und *S. triannuliformis* (Freyer, 1845). Futterpflanzen sind verschiedene *Rumex*-Arten (Polygonaceae). *S. maroccana* sp. n. ist im Hohen und Mittleren Atlas in Marokko in Höhen zwischen 1600 m und 2700 m weit verbreitet. Sie lebt ebenfalls in einer *Rumex*-Art (Polygonaceae). *Chamaesphecia powelli* comb. rev. war bisher mit Sicherheit nur vom Typenfundort in Algerien bekannt. Inzwischen wurde sie im Hohen Atlas von Marokko aus Wurzeln einer *Nepeta* (Lamiaceae) gezogen. Außerdem wird *S. affinis erodiiphaga* (Dumont, 1922) erstmals für die Fauna Marokkos und Südspaniens nachgewiesen.

Résumé. Le matériel-type de *Synansphecia atlantis* (Schwingenschuss, 1935), *S. borreyi* (Le Cerf, 1922), *S. powelli* (Le Cerf, 1916) et *S. aistleitneri* Špatenka, 1992 a été étudié et les espèces sont révisées et redécrites en détail. Le taxon *powelli* est retransféré au genre *Chamaesphecia*, la combinaison générique originale de l'espèce. Deux nouvelles espèces, *S. hispanica* sp. n. et *S. maroccana* sp. n., sont décrites respectivement d'Espagne et du Maroc. Une clé de détermination des espèces paléarctiques des groupes de *S. triannuliformis* et de *S. muscaeformis* est presentée. *S. atlantis* n'est connue que du Haut Atlas au Maroc, entre 2000 et 2900 mètres d'altitude. Sa plante-hôte est supposée être une espèce du genre *Armeria* (Plumbaginaceae). Elle est étroitement apparentée et semblable à *S. borreyi* et à *S. koschwitzi*. *S. borreyi* est connue de différentes localités au Maroc, de 400 à 2200 m. Les plantes-hôtes sont des espèces du genre *Limonium* (Plumbaginaceae). *S. hispanica* sp. n. est représentée en de nombreuses collections, mais elle a généralement été confondue avec *S. atlantis*. Elle est largement distribuée en Espagne et se rencontre également dans le Midi de la France. Elle est trouvée de la côte jusqu'à plus de 2000 m dans la Sierra Nevada. Elle est étroitement apparentée à *S. maroccana* sp. n. et à *S. triannuliformis* (Freyer, 1845). Les plantes-hôtes sont plusieurs espèces de *Rumex* (Polygonaceae). *S. maroccana* sp. n. est largement répandue aux monts Atlas marocains, se trouvant à des altitudes de 1600 à 2700 m. La plante-hôte est une espèce de *Rumex* (Polygonaceae). *Chamaesphecia powelli* comb. rev. n'était connue avec certitude que de la localité-type en Algérie. Récemment, elle a également été trouvée dans le Haut Atlas au Maroc. Elle a été élevée à partir des racines d'une espèce de *Nepeta* (Lamiaceae). De plus, *S. affinis erodiiphaga* (Dumont, 1922) est mentionnée pour la première fois du Maroc et du sud de l'Espagne.

Key words: Lepidoptera, Sesiidae, *Synansphecia*, *hispanica* sp. n., *maroccana* sp. n., *atlantis, borreyi, Chamaesphecia powelli* comb. rev., bionomics, revision, Morocco, Spain, France, Palaearctic.

Introduction

A study of the rich material of *Synansphecia* species collected mainly by German lepidopterists in Morocco, Spain and France raised a necessity to examine a number of type specimens of

south-western Palaearctic species of *Synansphecia* Capuse, 1973. Examination of the type material of *Synansphecia atlantis* (Schwingenschuss, 1935), *S. borreyi* (Le Cerf, 1922), *S. aistleitneri* Špatenka, 1992, and *S. powelli* (Le Cerf, 1916) revealed a misinterpretation of these species. With the numerous and fresh material now available from the area and the extended knowledge of host plants there is a better basis and also the need to revise these species.

Material mentioned in this article is deposited in the following collections: The Natural History Museum, London, U. K. (BMNH); Muséum national d'Histoire naturelle, Paris, France (MNHP); Museum Witt, München, Germany (MWM); Naturhistorisches Museum, Wien, Austria (NHMW); Niederösterreichisches Landesmuseum, Wien, Austria (NLMW); Museum für Naturkunde der Humboldt Universität zu Berlin, Germany (MNHB); Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany (ZFMK); Zoologische Staatssammlung München, Germany (ZSM); Museum für Naturkunde Karlsruhe, Germany (MNK).

Private collections: CDB — coll. D. Bartsch, Stuttgart; CBH — coll. D. Baumgarten, Hamburg; CEB — coll. E. Bettag, Dudenhofen; CRB — coll. R. Bläsius, Eppelheim; CTD — coll. T. Drechsel, Neubrandenburg; CJG — coll. J. Gelbrecht, Königs Wusterhausen; CTG — coll. T. Garrevoet, Antwerpen; CAK — coll. A. Kallies, Schwerin; CUK — coll. U. Koschwitz, Eppenbrunn; CAL — coll. A. Lingenhöle, Biberach; CHL — coll. H. Löbel, Sondershausen; CZL — coll. Z. Laštůvka, Brno; CMP — coll. M. Petersen, Pfungstadt; CFR — coll. F. Rämisch, Berlin; CHR — coll. H. Riefenstahl, Hamburg; CTS — coll. T. Sobczyk, Hoyerswerda; CKS — coll. K. Špatenka, Prag; CRS — coll. R. Stübinger, Hamburg.

The following abbreviations have been used throughout the text to designate particular areas of the forewing: ETA — external transparent area; ATA — anterior transparent area; PTA — posterior transparent area.

The structure of the genus *Synansphecia* Capuse, 1973

Morphological and taxonomical data of the closely related genera *Synansphecia* Capuse, 1973, *Dipchasphecia* Capuse, 1973

and *Chamaesphecia* Spuler, 1910 have been provided by Laštůvka (1990a, 1992). The genus is also closely related to the genus *Pyropteron* Newman, 1832.

The genus *Synansphecia* Capuse, 1973 is restricted to the western Palaearctic and includes 17 species at present. The larvae are root borers utilizing host plants of a wide range of plant families: Plumbaginaceae, Polygonaceae, Geraniaceae, Cistaceae, and Rosaceae. Within *Synansphecia* there are several groups of closely related species which can be separated by genitalic and external characteristics and which are restricted to specific host plant families.

a. *S. triannuliformis* group: *S. triannuliformis* (Freyer, 1845), *S. meriaeformis* (Boisduval, 1840), *S. maroccana* sp. n., *S. hispanica* sp. n.

Diagnosis. ♂ sometimes, ♀ always with white or yellow subapical spot of antenna; male genitalia very homogenous within the different species, with simple gnathos and crista sacculi (figs. 18, 19).

Host plants. Polygonaceae (*Rumex* spp.). *S. triannuliformis* has also been reported from *Geranium*, Geraniaceae (Špatenka *et al.*, 1997).

Distribution. Northwest Africa, Europe, Middle East.

b. *S. muscaeformis* group: *S. muscaeformis* (Esper, 1783), *S. borreyi* (Le Cerf, 1922), *S. atlantis* (Schwingenschuss, 1935), *S. koschwitzi* Špatenka, 1992

Diagnosis. ♂ without, ♀ usually with white to yellowish subapical spot of antenna; male genitalia very homogeneous, with simple gnathos and crista sacculi (figs. 20, 21).

Host plants. Plumbaginaceae (*Armeria* spp., *Limonium* spp.).

Distribution. Northwest Africa and south-western Europe, but *S. muscaeformis* extending to central and eastern Europe.

c. *S. leucomelaena* group: *S. leucomelaena* (Zeller, 1847), *S. aistleitneri* Špatenka, 1992, *S. kautzi* (Reisser, 1930), *S. affinis affinis* (Staudinger, 1856), *S. affinis erodiiphaga* (Dumont, 1922)

Diagnosis. ♂ without, ♀ sometimes with white to yellowish subapical spot of antenna; male genitalia with specialized gnathos (crista medialis and crista lateralis linked distally), crista sacculi hooked distally, setae often separated in two fields.

Host plants. Rosaceae (*Poterium* spp.), Cistaceae (*Helianthemum* spp., *Fumana* spp.), Geraniaceae (*Erodium* sp.). Unknown for *S. aistleitneri* and *S. kautzi.*

Distribution. Holomediterranean.

d. *S. umbrifera* group: *S. umbrifera* (Staudinger, 1870), *S. cirgisa* (Bartel, 1912), *S. koshantschikovi* (Püngeler, 1914)

Diagnosis. Rather large species; discal spot of hindwing broad, sometimes connected by scaled area to outer margin of wing; male genitalia with simple gnathos, setae of crista sacculi separated in two fields.

Host plants. Plumbaginaceae (*Limonium* spp.).

Distribution. South-eastern Europe, Middle East to western Central Asia.

e. *S. mannii* group: *S. mannii* (Lederer, 1853), *S. hera* Špatenka, 1997

Diagnosis. Small to medium sized species; ground-colour brownish; male genitalia with simple gnathos, crista sacculi strongly hooked distally, setae continuously.

Host plants. Geraniaceae (*Geranium* spp.), unknown for *S. hera.*

Distribution. Eastern Mediterranean (Bulgaria, Greece, Turkey).

Note. According to bionomic characteristics, *S. doryliformis* (Ochsenheimer, 1808) is similar to the *Synansphecia triannuliformis*-group, but isolated by genitalic and external characteristics. However, the species shows strong affinities to the genus *Pyropteron* Newman, 1832. The generic position of *S. doryliformis* and consequentely the status of the genus *Synansphecia* in relation to *Pyropteron* should be carefully investigated.

Synansphecia triannuliformis and *S. muscaeformis* species groups

The members of the *S. triannuliformis* and *S. muscaeformis* groups form a complex of closely related species. Due to their homogeneous external appearance and the lack of suitable differences in their genitalia they are often difficult to distinguish. Nevertheless, both groups are well separated by their bionomical characteristics, with larvae feeding either in species of the Polygonaceae (*S. triannuliformis* group) or Plumbaginaceae (*S. muscaeformis* group). In the adults, the two species groups can be distinguished by the presence (*S. triannuliformis* group) or absence (*S. muscaeformis* group) of a yellow to white spot of the male antenna dorso-subapically. However, this spot is usually absent in ♂♂ of *S. triannuliformis* itself, while it is present in all ♀♀ of both species groups.

The following characteristics of the male genitalia are common to both groups: valva with simple crista sacculi, curved apically, with broad scale-like setae dorsally; uncus-tegumen complex

→

Figs. 1–8. 1–2 — *Synansphecia maroccana* sp. n., Morocco, Oukaimeden: 1 — ♂, paratype (CAK), wingsp. 21.5 mm. 2 — ♀, paratype (CHR), wingsp. 21.5 mm. 3–4 — *Synansphecia hispanica* sp. n., Spain: 3 — ♂, paratype (CAK), wingsp. 21.0 mm; 4 — ♀, paratype (CAK), wingsp. 21.0 mm. 5–7. *Synansphecia atlantis* (Schwingenschuss, 1935): 5 — ♂, paralectotype, Morocco (NLMW), wingsp. (reconstructed) 20.0 mm; 6 — labels of paralectotype; 7 — ♀, Morocco, Oukaimeden (BMNH), wingsp. 21.0 mm. 8 — *Synansphecia aistleitneri* Špatenka, 1992, ♀, holotype, Spain (MWM), wingsp. 22.5 mm.


1


2


3


4


5


H.Atlas Maroc.
Dj. Ouheddane 2000
-2700m. 23.VI.1933
Schwingenschuss
Monogr. Pal. Ses.
Gen. No. 606
Sy. atlantis
PARALECTOTYPUS ♂
Chamaesphecia
atlantis Schwingenschuss 1933
6


7


8

strong, curved dorsally; crista lateralis and medialis simple, ear-shaped, not connected to each other; scopula androconialis long and strongly covered with setae; aedeagus about as long as valva, with numerous small shark tooth-shaped cornuti; saccus narrow, about half as long as aedeagus.

S. triannuliformis species group

Synansphecia triannuliformis (Freyer, 1845)

Sesia triannuliformis Freyer, 1845: 35. Type locality: Konstantinopel (Istanbul, Turkey). Type material: lost.
Bembecia triannuliformis: Heppner & Duckworth, 1981: 40.
Synansphecia triannuliformis: Laštůvka, 1990a: 94; Laštůvka, 1990b: 129–132; Špatenka *et al.*, 1993: 103; Laštůvka & Laštůvka, 1995: 96; de Freina, 1997: 166–169.

Material examined. There was no material from France available for examination. Extensive material from Germany, the Balkan Peninsula and Asia Minor has been studied.

According to Laštůvka & Laštůvka (1995), in the south-western Palaearctic this ponto-mediterranean species has only been recorded from south-eastern France, where it reaches the most western part of its range. Literature records from Spain and Morocco (de Freina, 1997) are likely to refer to *Synansphecia hispanica* sp. n., *S. maroccana* sp. n. or *S. borreyi* (Le Cerf, 1922). From these species it can easily be distinguished by the anal tuft of the male (divided into three tufts in *S. triannuliformis*, simple in the species compared), the absence of the white subapical spot of the antenna of males (present in *S. hispanica* sp. n. and *S. maroccana* sp. n.), and bionomical characteristics (the larvae of *S. borreyi* live in *Limonium* spp., those of *S. triannuliformis* in *Rumex* spp.). For details, see the key below.

→

Figs. 9–16. 9–10 — *Synansphecia koschwitzi* Špatenka, 1992, Spain, Aranjuez: 9 — ♂ (CAK), wingsp. 19.0 mm; 10 — ♀ (CAK), wingsp. 19.0 mm. 11–14 — *Synansphecia borreyi* (Le Cerf, 1922): 11 — ♀, Morocco, Ifrane (CAK), wingsp. 23.5 mm; 12 — ♀, Morocco, Mrirt (CAK), wingsp. 23.5 mm; 13 — ♂, lectotype (MNHP), wingsp. 23.0 mm; 14 — labels of lectotype. 15–16 — *Chamaesphecia powelli* Le Cerf, 1916: 15 — ♀, holotype, Algeria (MNHP), wingsp. 16.0 mm; 16 — labels of holotype.

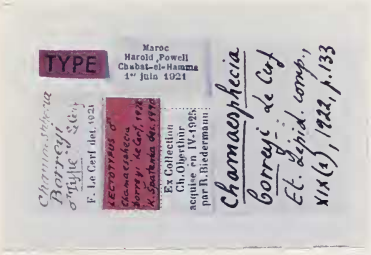
9

10

11

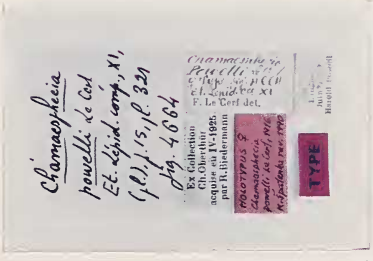
12

13



14

15



16

Synansphecia maroccana sp. n. (figs. 1, 2, 17a, 18)

Laštůvka & Laštůvka, 1995: 96, fig. 62; pl. 6, fig. 8 (as *S. borreyi*, misidentified); de Freina, 1997: 167, 171–172 (part.), figs. 159, 163; pl. 13, figs. 28–34 (as *S. borreyi*, misidentified), fig. 43 (as *S. atlantis*, misidentified).

Material examined. Holotype ♂, "Marokko, Haut Atlas, Oukaimeden, 2600 m, 5.–10.VII.1994 Ph[eromon] F[ang]., leg. Th. Drechsel" (MNHB). Paratypes (191♂, 3♀, all from Morocco): 74♂, same data as holotype (CAK, CMP, CKS, CHR, CEB, CJG, CFR, CTD, CZL, CTG, MNHB, ZFMK); 56♂, High Atlas, Oukaimeden, 2300–2700 m, 5.–10.VII.1994 leg. Dr. Löbel (CHL, CAK, CDB, CHR, CJG, CFR); ♂, High Atlas, Oukaimeden, 2650 m, 12.VIII.1996, leg. R. Bläsius (CRB); ♂, same data, but reared from *Rumex* sp., 9.IV.1997 e.l. (CRB); ♂, High Atlas, Oukaimeden, 2300–2700 m; 12.–15.VII.1976, leg. W. Thomas; 35♂, ♀, High Atlas, Oukaimeden, 2700 m, 22.–25.VI.1998, leg. A. Lingenhöle (CAL, CAK); ♂, High Atlas, Tizi-n-Tichka, north-side, 2000 m, 14.VI.1996, leg. A. Kallies (CAK); 9♂, ♀, Middle Atlas, Ifrane, 1700 m, 27.VI.–6.VII.1994, leg. Riefenstahl (CHR, CAK, CZL); 10♂, ♀, Ifrane, 1650 m, 28.VI.–8.VII.1994, leg. Stübinger (CAK, CRS); 2♂, Middle Atlas, Tizi n' Tretten, 30.VI.–5.VII.1994, 2200 m, leg. Riefenstahl (♂, gen. prep. by A. Kallies, prep. No. 30-96) (CAK, CHR); ♂, Daiet-Achlef, Deuxieme quinzaine de juillet, Harold Powell (CKS).

The species is present in many collections but has usually been confused with *S. borreyi* (Le Cerf, 1922). However, both species belong to different species groups.

Description (♂ holotype, paratype, fig. 1). Wingspan 21.0 mm; body length 12.5 mm; forewing length 9.5 mm; antenna 7.0 mm.

Head. Antenna black, with white spot dorso-subapically, scapus black, yellow ventrally; frons yellowish grey, yellow laterally and before antenna; labial palpus yellowish white, middle and apical joint black laterally; vertex black mixed with orange scales, without white spot between antenna and ocellus; pericephalic hairs yellow.

Thorax. Fuscous dorsally, with a narrow yellow line medially; patagia black; tegula with narrow yellow inner margin and apex; metathorax with two yellow patches submedially; fuscous ventrally, with patches of yellow scales.

Legs. Fore coxa fuscous, yellowish white apically and laterally; fore femur, tibia and tarsus fuscous, strongly mixed with yellow ventrally; mid and hind leg brownish, tibiae almost ochreous white throughout, spurs yellowish white, tarsi strongly mixed with yellow scales.

Abdomen. Blackish brown dorsally, covered with ochreous brown, partly yellow scales throughout, with a weak interrupted line medially; tergites 2, 4 and 6 each with a narrow white margin posteriorly; blackish brown ventrally, with single white scales medially; sternites 3–5 each with weak white margins posteriorly; anal tuft blackish brown dorsally, with yellow and ochreous scales medially; anal tuft ochreous yellow ventrally, blackish brown medially.

Forewing. Veins blackish brown, covered with ochreous brown scales almost throughout; ETA rounded, somewhat broader than discal spot, with a narrow extension of apical area into ETA along R_4/R_5; apical area as broad as ETA, brown, ochreous between veins; discal spot blackish brown, outer half strongly covered with light brown and yellow scales; ATA well developed; PTA weak, not reaching discal spot, partly covered with ochreous brown scales; cilia brownish grey; with brown veins ventrally, covered with yellow scales almost throughout; apical area yellow between veins.

Hindwing. Veins dark brown; discal spot very broad (fig. 17a); obtuse triangular, not reaching M_3; outer margin brownish; cilia brownish grey.

Male genitalia (fig. 18). Uncus-tegumen complex broad, strongly curved dorsally; gnathos with crista medialis relatively low, membranous extending towards proximal part; aedeagus with comparably few cornuti; saccus relatively short.

Female (paratype, fig. 2). Wingspan 21.0 mm; body length 13.0 mm; forewing length 9.5 mm; antenna 6.0 mm. Similar to ♂, but discal spot of forewing broader, that of hindwing almost reaching M_3; anal tuft with two submedial bunches of ochreous scales dorsally, somewhat darker ventrally; ATA shorter and broader; PTA present, but very narrow.

Female genitalia. Not examined.

Variation. Less variable in wingspan, size of transparent areas and coloration; wingspan from 19.0 to 22.0 mm (extreme 16.0 mm).

Differential diagnosis. This species is characterized by its ochreous brown coloration and the broad and short discal spot of the hindwing. It is closely related to *S. hispanica* sp. n., described below (see there for diagnosis). Superficially, it is also

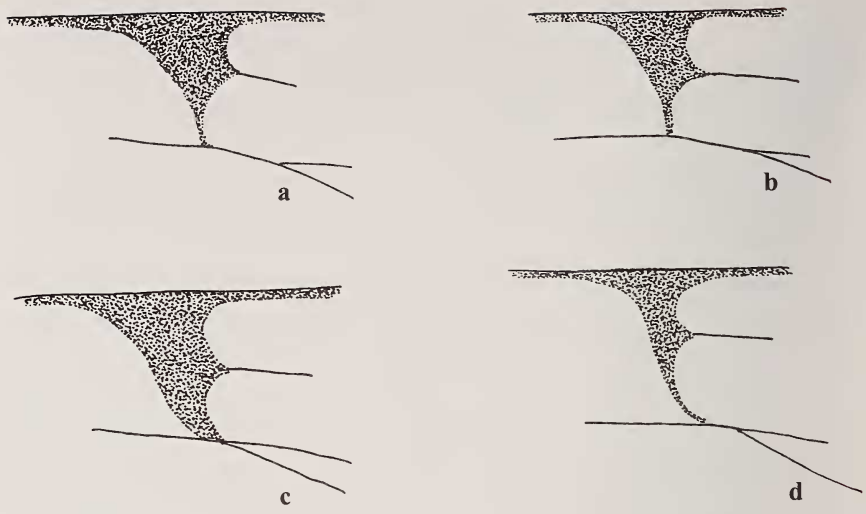


Fig. 17. Discal spots of hindwings of *Synansphecia* species: a — *S. maroccana* sp. n.; b — *S. hispanica* sp. n.; c — *S. atlantis* (Schwingenschuss, 1935); d — *S. borreyi* (Le Cerf, 1922).

similar to *S. borreyi*. From this species it can be easily distinguished by the presence of a white subapical spot of the antenna of the ♂ (not present in *S. borreyi*), by the broad and short discal spot of the hindwing (very narrow in *S. borreyi*), by the shape of the PTA (well developed in *S. borreyi*) and by the absence of the white spot between the base of antenna and the ocellus (present in *S. borreyi*).

Distribution. This species is known from the High and Middle Atlas Mts, Morocco.

Habitat and bionomics. The species was collected at altitudes between 1650 and 2700 m, adults flying from mid June to early August. The host plant is an unidentified species of *Rumex*, similar to *R. acetosa* (Drechsel & Bläsius, pers. comm.).

Synansphecia hispanica sp. n. (figs. 3, 4, 17b, 19)

Laštůvka & Laštůvka, 1995: 94, fig. 59; pl. 6, figs. 2, 3 (as *S. atlantis*, misidentified); de Freina, 1997: 166–167 (part.), 172, fig. 160, 164; pl. 13, fig. 36–42; pl. 24, fig. 6 (as *S. atlantis*, misidentified); pl. 13, fig. 51 (as *S. koschwitzi*, misidentified).

Material examined. Holotypus ♂ "5.6.1993 e.l., S[ierr]a Baza [ca. 2000 m], Prov. Almeria, Spanien, [ex] *Rumex scut*[*atus*]., leg. R. Bläsius" (MNHB). Paratypes, from Spain (95♂, 22♀): 5♂, 4♀, same data as holotype, 6.III.–10.VI.1993 e.l. (CRB, CMP); 3♂, Prov. Almeria, Sierra Baza, 1600 m, 10.VII.1993, leg. R. Bläsius (CRB); ♀, Andalusia, Sierra Baza, Escullar, 19.VI.1993, ex *Rumex scutatus*, 25.–27.VI.1993 e.l., leg. D. Bartsch (CDB); 2♂, ♀, Prov. Almeria, Sierra Filabres, Albanchez, ca. 1000 m, 1.V.–10.VI.1993 e.l., ex *Rumex scutatus*, leg. R. Bläsius (CRB, CHR); 8♂, Prov. Malaga, Jubrique, Sierra Bermeja, 500–600 m, 16.VII.1993 resp. 7.VI.1993, leg. R. Bläsius (CRB, CJG, CAK, CZL, CTS); 3♂, Prov. Almeria, Puerto Lumbreras, 25.V.1994, leg. E. Bettag (CEB); 4 Ex., Prov. Almeria, Sierra Filabres, e.l. 28.VI.1994, leg. E. Bettag (CEB); 3♂, ♀, Prov. Malaga, Ronda, 800 m, 29.V.1995 resp. 21.VII.1992 resp. 15.VII.1993, leg. R. Bläsius (CRB, CAK); 2♀, same data, but 18.IV. and 5.V.1993 e.l. leg. R. Bläsius (CHR, CZL); 4♂, Andalusia, Ronda, 500 m, 26.–27.VI.1993, leg. Bartsch (CDB); 7♂, 5♀, Andalusia, Sra de Ronda, Madronal, 600 m, 1.VII.1994, leg. Z. Laštůvka (CZL); 3♂, Andalusia, Sra de Ronda, El Burgo, 1100 m, 28.VI.1994, leg. Z. Laštůvka (CZL); 2♂, Andalusia, Sra Guillimona, 1800 m, 16.VII.1993, leg. Z. Laštůvka (CZL); ♀, Sra Nevada, N Laujar, 1600 m, 29.VI.1992, leg. Z. Laštůvka (CZL); 8♂, ♀, Prov. Malaga, Benahavis, 25.VI.1991, 200 m, leg. Riefenstahl (CHR, CMP, CKS); ♂, Prov. Malaga, Casares, 600 m, 22.VI.1991, leg. Riefenstahl (CKS); ♂, Prov. Malaga, St. Perdo, 24.VI.1991, 100 m, leg. Riefenstahl (CAK); 2♂, ♀, Andalusia, Carratraca, 300 m, 12.–13.VII.1993, leg. Z. Laštůvka (CKS, CZL); 6♂, same data, but 27.VI.1994 (CZL); 7♂, Prov. Malaga, Rio Genal, Pujerra, 30.V.1995, leg. E. Bettag (CEB); 4♂, Prov. Malaga, Ganciu, 600 m, 30.V.1995, leg. R. Bläsius (CRB); 2♂, Prov. Malaga, Juzcar, 800 m, 13.VII., 16.VII.1993 resp., leg. R. Bläsius (CRB); ♂, Prov. Granada, Sierra Blanquilla, Benaojan, 26.VI.1989, leg. K. Špatenka (CKS); 2♂, Prov. Granada, Sierra Nevada, Bayarcal, 1400 m, 15.VII.1992, leg. Bläsius (CRB); 4♂, Prov. Granada, Sierra Nevada, Trevelez, 1500 m, 20.VII.1993, leg. R. Bläsius (CRB); ♂, Prov. Murcia, Puerto Lumbreras, 600 m, 23.V.1994, leg. R. Bläsius (CRB); 10♂, Prov. Huelva, Mazagon, 0 m, 24.V.1991, leg. M. Petersen (CMP, CKS, CZL); 2♂, Prov. Cadiz, Tarifa, 0 m, 19.V.1994 bzw. 1.VI.1995, leg. R. Bläsius (CRB); ♂, Prov. Cadiz, Barbate, 0 m, 19.V.1994, leg. R. Bläsius (CRB); ♂, Prov. Leon, N Parada Secca, N Villa Franca, 6.VII.1992, leg. Fery (MNHB); ♂, Cuenca (Cast.), "an *Artemisia* fliegend", Korb 31.7.[18]96 / coll. Osthelder (ZSM); ♀, Cuenca (Cast.), "an *Salvia* fliegend", Korb 31.7.[18]96 / coll. Osthelder (ZSM). Paratypes, from France (18♂, 16♀): 7♂, 13♀, Dep. Hérault, Marseilan Plage, 26.VI.1990, leg. Baumgarten (♂, gen. prep. by A. Kallies, No. 107–96; ♂, gen. prep., *Synansphecia muscaeformis* Esp. [sic!], det. Riefenstahl) (CBH, CHR, CAK); 2♂, Gallia mer., Aigues Mortes, 19.VI.1994, leg. Z. Laštůvka (CZL); 9♂, 3♀, Camargue, vic. Aigues-Mortes, larvae 24.III.1995 ex *Rumex tingitanus*, 16.VI.–19.VII.1995 e.l., leg. D. Bartsch (CDB).

This species is represented in many collections, but usually confused with *S. atlantis* (Schwingenschuss, 1935). However, both species belong to different species groups. *S. atlantis* is known only from the High Atlas Mts, Morocco, while *S. hispanica* sp. n. is restricted to south-western Europe.

Description (♂ holotype, paratype, fig. 3). Wingspan 19.0 mm; body length 13.0 mm; forewing length 9.0 mm; antenna 6.5 mm.

Head. Antenna black, with prominent white spot dorso-subapically, scapus black, grey ventrally; frons leaden grey, white laterally; labial palpus white, middle and apical joint mixed with black scales laterally and dorsally; vertex black, with some yellow scales anteriorly; a small white spot between antenna and ocellus present; pericephalic hairs yellow dorsally, white ventrally and laterally.

Thorax. Black dorsally, with a weak yellow line medially; patagia black; tegula with narrow yellow inner margin; metathorax yellowish white, black ventrally, with patches of pale yellow and white scales.

Legs. Fore coxa white, blackish grey interiorly; fore femur, tibia and tarsus blackish grey; mid and hind leg blackish, mid femur with anterior margins pale yellowish white; mid tibia white dorsally, spurs grey; proximal two thirds of hind tibia white dorso-laterally, spurs white.

Abdomen. Fuscous; tergites partly with brown scales anteriorly; tergite 1 with some yellowish white scales posteriorly; tergites 2, 4 and 6 with narrow white margins posteriorly; sternites fuscous with a few white scales on sternites 3 and 4; abdomen with an almost complete narrow white line laterally; anal tuft fuscous dorsally, with single yellow scales medially, with some submedial yellow scales ventrally.

Forewing. Black; ETA rounded, as broad as discal spot, consisting of a small cell between R_3 and R_4/R_5, three long cells between R_4/R_5 and M_3 and a small cell between M_3 and Cu_1 (the small cells more or less covered with whitish hyaline scales); discal spot black, with a few ochreous scales externally; apical area blackish, light grey between veins; ATA well developed; PTA developed, not extending to discal spot; cilia black; veins black ventrally, but discal spot and apical area strongly dusted with white scales; apical area black, with white scales between veins.

Hindwing. Veins black; discal spot (fig. 17b) broad triangular, extending to half distance between M_2 and M_3; outer margin black; cilia black; veins black ventrally, dusted with white scales.

Male genitalia (fig. 19). Similar to *S. maroccana.* Uncus-tegumen complex narrower, less strongly curved; gnathos with

crista medialis relatively high and more strongly curved, not extending towards proximal part; aedeagus with many small cornuti; saccus slightly longer.

Female (paratype, fig. 4). Wingspan 20.0 mm; body length 13.0 mm; forewing length 9.0 mm; antenna 6.0 mm.

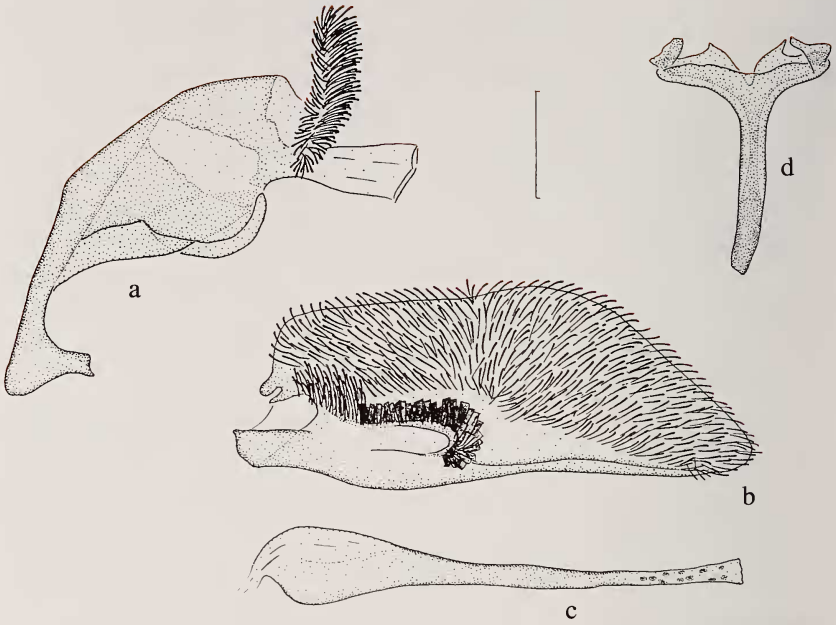
Females differ from males by the following characteristics: PTA weak, covered with black scales almost throughout; ATA bordered with yellow scales; veins in ETA covered with yellow scales; costal margin yellow subapically; abdomen with well-developed yellow line medially (more or less disrupted in spots); yellow posterior margins of tergites broader; anal tuft with two white submedial tufts dorsally.

Variation. Wingspan from 18.0 to 21.0 mm in ♂♂ (exceptionally 14.0 mm), 18.0 to 23.0 mm in ♀♀. This species is somewhat variable in the size of the ETA, usually consisting of 5 cells, in ♀♀ frequently only of 3 to 4 cells. The medial dorsal line of the abdomen is often weakly expressed. Specimens from France are usually somewhat larger than those from Spain.

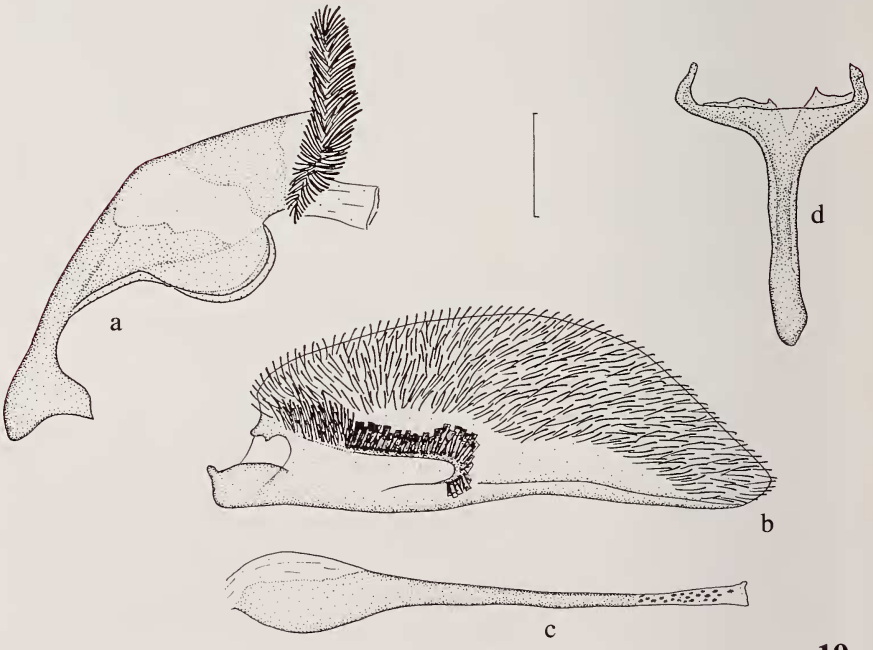
Differential diagnosis. *S. hispanica* is closely related to *S. maroccana*, but differs by the black coloration and the white pattern of the body and legs (ochreous brown with yellowish pattern in *S. maroccana*), by the small discal spot of the hindwing (broad in *S. maroccana*), and by the presence of a small snow-white spot between base of antenna and ocellus (absent in *S. maroccana*). There are additional differences in the discal spot of the forewing in the ♀♀ (broader in *S. maroccana*), in the ATA (shorter in *S. maroccana*), and the PTA (well developed in *S. maroccana*).

Distribution. This species is known from Andalusia (Malaga, Almeria, Granada, Murcia, Cadiz, Huelva) and Castilia (Cuenca, Leon) to the Mediterranean coast in southern France.

Habitat and bionomics. In Spain this species is found at altitudes from sea level up to more than 2000 m in the Sierra Nevada, adults being observed from the middle of May to the end of July. In France the species was found only at sea level close to the coast in June. In Spain, *Rumex scutatus* was recorded as the larval host plant by R. Bläsius. In southern France *S. hispanica* lives in *Rumex tingitanus* (D. Baumgarten & D. Bartsch, pers. comm.). Males are attracted by artificial phero-



18



19

mones in the afternoon between 2:00 and 5:30 p.m. (Riefenstahl, pers. comm.). According to the attached labels two specimens collected by Korb were observed visiting *Artemisia* and *Salvia*.

Synansphecia meriaeformis (Boisduval, 1840)

Sesia meriaeformis Boisduval, 1840: 42. Type locality: Andalusia (Granada), Spain. Type material: lost.
Chamaesphecia meriaeformis: Heppner & Duckworth, 1981: 35.
Synansphecia meriaeformis: Laštůvka, 1990a: 94; Špatenka *et al.*, 1993: 103; Laštůvka & Laštůvka, 1995: 92; de Freina, 1997: 176–178.

Material examined. Numerous specimens from France and Italy were studied. The species is present in most of the collections mentioned above.

A well-known species occurring in southern France, Spain, and Italy. It is the smallest species of the genus and it can usually be distinguished easily from all congenerics (see the key below).

S. muscaeformis species group

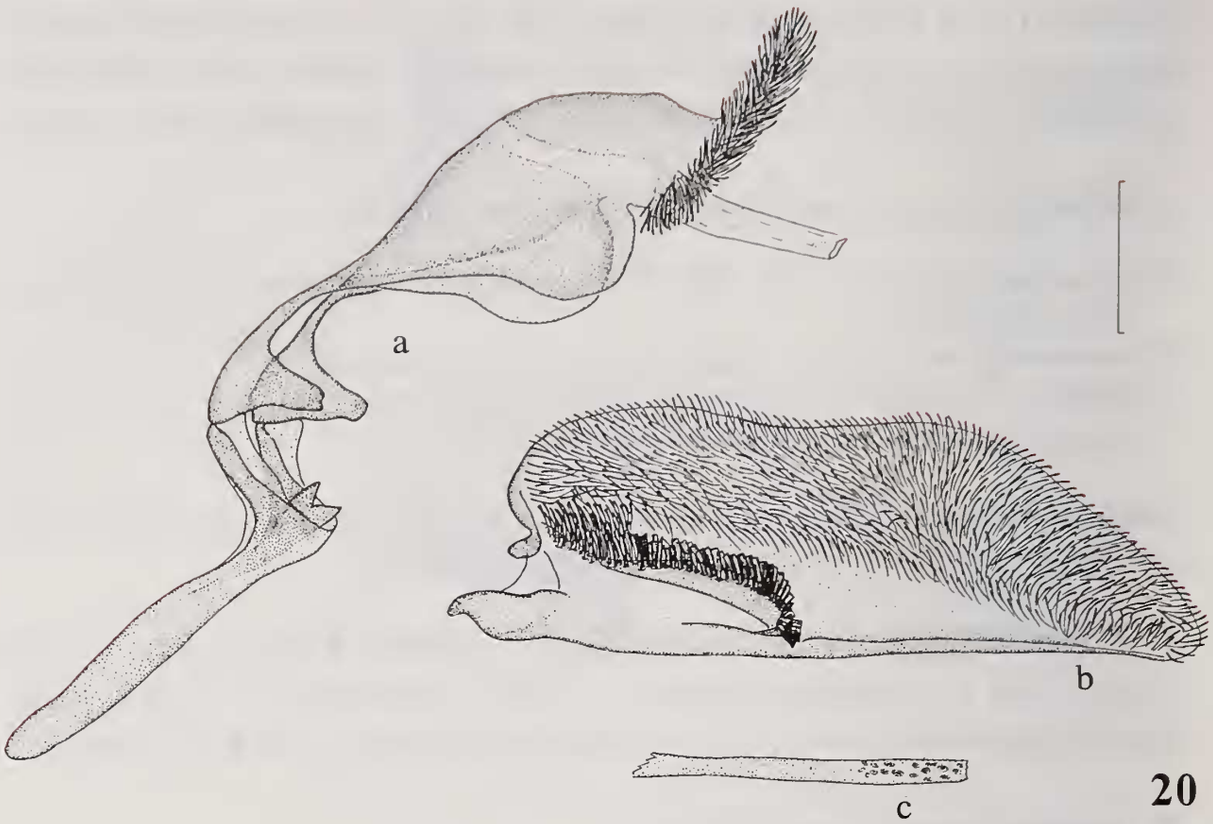
Synansphecia muscaeformis (Esper, 1783)

Sphinx muscaeformis Esper, 1783: 217. Type locality: Frankfurt/Main (Germany). Type material: lost.
Bembecia muscaeformis: Heppner & Duckworth, 1981: 39.
Synansphecia muscaeformis: Laštůvka, 1989: 177–180; Laštůvka, 1990a: 94; Špatenka *et al.*, 1993: 103; Laštůvka & Laštůvka, 1995: 98; de Freina, 1997: 169–171.

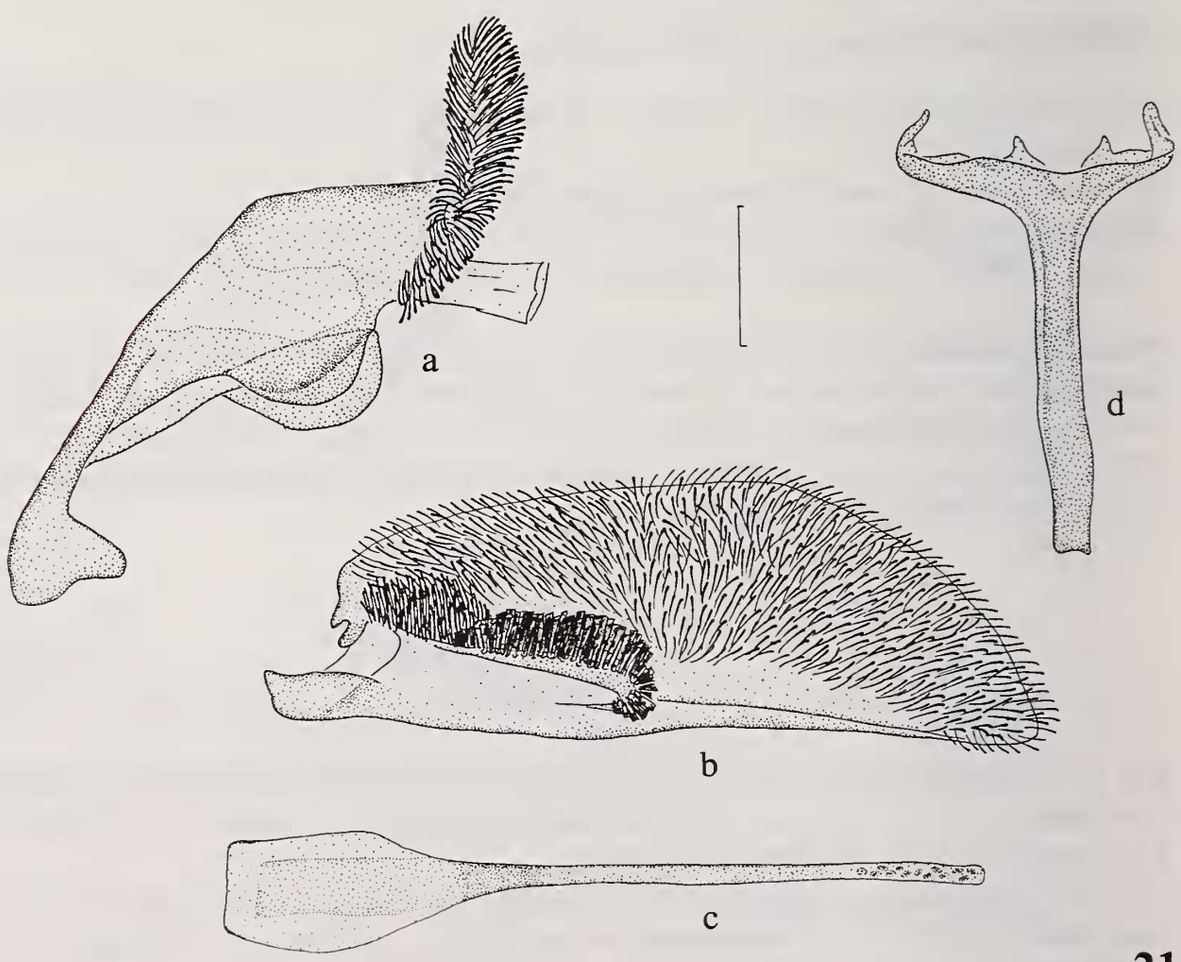
Material examined. 2♂, 2♀, [France] Sene, 31. Mai–6. Juin / J. de Joannis O2 dom. (lectotype and paralectotypes of *Sesia philanthiformis* ssp. *occidentalis* de Joannis, 1908; designated by Špatenka, 1992a); ♂, Spain, Prov. Lerida, Coll. del Canto, 1600 m, 19.VII.1993, leg. et coll. Laštůvka. Additional extensive material from Germany, Austria, and Italy has been examined.

←

Fig. 18. *Synansphecia maroccana* sp. n., paratype ♂, Morocco, Oukaimeden, genitalia (gen. prep. AK27) (CAK): a — tegumen-uncus complex; b — valva; c — aedeagus; d — vinculum, saccus. Reference bar 0.5 mm.
Fig. 19. *Synansphecia hispanica* sp. n., paratype ♂, Spain, Malaga, genitalia (gen. prep. AK97) (CAK): a — tegumen-uncus complex; b — valva; c — aedeagus; d — vinculum, saccus. Reference bar 0.5 mm.



20



21

According to Laštůvka & Laštůvka (1995), in addition to the main part of its range in central Europe this species occurs in northern and western France, and in the Pyrenees.

The only specimen from Spain, which was available for examination was collected in a population of *Armeria* (Laštůvka, pers. comm.).

Synansphecia borreyi (Le Cerf, 1922) (figs. 11, 12, 13, 14, 17d, 21, 22)

Chamaesphecia borreyi Le Cerf, 1922: 133. Type locality: Morocco, Chabat-el-Hamma. Lectotype: ♂ (MNHP, designated by Špatenka, 1992a). Heppner & Duckworth, 1981: 35.

Synansphecia borreyi: Špatenka, 1992a: 490; Špatenka *et al.*, 1993: 102; Laštůvka & Laštůvka, 1995: 96 (part.); de Freina, 1997: 171–172 (part.).

Material examined. Lectotype ♂, with labels illustrated on Fig. 14; Paralectotypes: 2♂, 3♀ with identic labels (♂ gen. prep. AK26, ♀ gen. prep. AK50) (MNHP). Additional material from Morocco: ♀, same data as holotype, without type label (CTG); 9♂, 8♀, Middle Atlas, Tizi n' Tretten, 1900 m, 10 km south of Ifrane, larva: 16.IV.1997, reared from *Limonium* sp., 10.–15.VI.1997 e.l., leg. A. Kallies (CAK); 4♂, 4♀, Middle Atlas, 5km NNE Mrirt, ca. 1200 m, larva: 14.IV., reared from *Limonium* sp., 15.–31.V.1997 e.l., leg. A. Kallies (CAK); 35♂, 4♀, Middle Atlas, Ifrane, 1700 m, 27.VI.–6.VII.1994, leg. Riefenstahl (CHR, CAK, CEB, CKS, CZL, CAL); 20♂, 2♀, same data, but leg. Stübinger (CRS, CHR, CAK); 5♂, ♀, Middle Atlas, Tizi n' Tretten, 30.VI.–5.VII.1994, 2200 m, leg. Riefenstahl (CHR).

This species was described from a series of specimens taken in western Morocco. Later, it has usually been confused with *S. maroccana* sp. n. (Laštůvka & Laštůvka, 1995; de Freina, 1997), described above. According to the bionomical data and the external characteristics both species belong to different species groups.

←

Fig. 20. *Synansphecia atlantis* (Schwingenschuss, 1935), paralectotype ♂, Morocco, Dj. Oucheddene, genitalia (gen. prep. AK86) (NLMW): a — tegumen-uncus complex; b — valva; c — aedeagus. Reference bar 0.5 mm.

Fig. 21. *Synansphecia borreyi* (Le Cerf, 1922), paralectotype ♂, Morocco, Chabat-el-Hamma, genitalia (gen. prep. AK21) (MNHP): a — tegumen-uncus complex; b — valva; c — aedeagus; d — vinculum, saccus. Reference bar 0.5 mm.

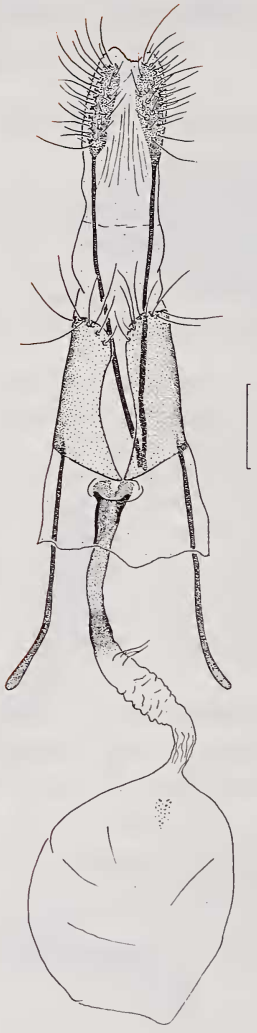


Fig. 22. *Synansphecia borreyi* (Le Cerf, 1922), paralectotype ♀, Morocco, Chabat-el-Hamma, genitalia (gen. prep. AK50) (MNHP). Reference bar 0.5 mm.

Description (♂ lectotype, fig. 13). Wingspan 23.0 mm; body length 13.5 mm; forewing length 10.5 mm; antenna 7.5 mm.

Head. Antenna black, without white spot subapically; frons leaden grey, white laterally; vertex black with orange-yellow scales anteriorly; labial palpus white, middle joint with narrow black stripe laterally, apical joint mixed with black; a white spot between base of antenna and ocellus.

Thorax. Black, with a narrow yellow line medially; patagia black, white ventro-laterally; tegula black, with narrow yellow inner margin and yellow scales apically; mesothorax with two white patches submedially; thorax fuscous ventrally, with small patches of white to pale yellow scales laterally.

Legs. Fore coxa snow-white (other parts missing); mid femur fuscous, with white hair-like scales and with yellowish white anterior margin, white interiorly; base of mid tibia brownish grey externally, ochreous distally, white interiorly; spurs white; mid tarsus grey, mixed with white scales (hind leg broken off) Paralectotype: hind femur fuscous with white hair-like scales, anterior margin yellowish white; hind tibia white ochreous, exteriorly fuscous subapically, base interiorly fuscous; spurs white; hind tarsus fuscous, dusted with white scales.

Abdomen. Black, covered with beige brown scales almost throughout; tergites 2–7 with white line medially; tergite 1 scattered with a few yellow-white scales; tergite 2 with white scales at posterior margin laterally; tergite 4 with narrow white margin posteriorly; sternites black, each with a narrow white posterior margin, dusted with white scales throughout; anal tuft black dorsally, with tufts of white scales medially and laterally; anal tuft white almost throughout ventrally.

Forewing. ETA broader than high, about 1.8 as broad as discal spot, consisting of 5 cells, with a small projection of apical area into ETA between R_4/R_5; apical area fuscous with yellowish ochreous scales between veins, near M_1 narrower than ETA; ATA and PTA well developed; PTA almost reaching discal spot of forewing; discal spot fuscous, with brownish ochreous scales exteriorly; veins fuscous, dusted with yellow to ochreous scales; cilia fuscous; similar ventrally, but veins strongly dusted with white scales.

Hindwing. Discal spot narrow, triangular, extending to half way between M_2 and M_3/Cu_1; veins and cilia fuscous; similar ventrally, but veins heavily dusted with white scales.

Male genitalia (fig. 21). Uncus-tegumen complex relatively narrow; gnathos with crista medialis of medium hight, somewhat membranous towards proximal part; aedeagus with small cornuti; saccus long and narrow.

Female (figs. 11, 12). Similar to male, but differing by the smaller ETA (rounded, about 1.3 as broad as discal spot); apical area broader, almost as broad as ETA at vein M_1; the white to yellow mediodorsal abdominal line more strongly expressed; antenna with few white scales subapically.

Female genitalia (fig. 22). Papilla analis membranous, slightly sclerotized ventrally, covered with long setae; posterior apophysis longer than anterior apophysis; antrum well sclerotized, less so in medial part; bursa rounded, membranous, with only very weak sclerotization near ductus bursae.

Variation. A rather variable species, both in size and coloration even within populations. Wingspan of ♂♂ 18–23 mm, ♀♀ 19–24 mm; the yellow mediodorsal line on thorax and abdomen may be absent; the ochreous to brown scales vary in abundance; the extension of the ETA varies (1.8 to 2.5 as broad as discal spot in ♂♂, 1 to 1.5 in ♀♀), fore coxa sometimes with grey scales interiorly in ♂♂.

Diagnosis. *S. borreyi* is closely related and similar to *S. koschwitzi* and *S. atlantis*. Both differ from *S. borreyi* in the ETA (small and rounded in the species compared); the apical area (broader); the coloration of body and wings (without ochreous brown scales); in the PTA (shorter); the discal spot of the hindwing (broader) and by the fore coxa in the ♂ (always black interiorly). See also key below.

Distribution. This species is known from the type locality near Rabat in western Morocco and from the Middle Atlas Mts in central Morocco. Literature records from Spain (Laštůvka & Laštůvka, 1995) refer to *Synansphecia hispanica* sp. n. described above.

Habitat and bionomics. Specimens were bred from roots of two different *Limonium* species from the Middle Atlas near Mrirt (Petersen & Lingenhöle, pers. comm.; Kallies, pers. obs., 1997)

and Ifrane (Kallies, pers. obs., 1997), respectively. The species is known from altitudes between 400 and 2200 m. Adults have been collected between 1st and 29th of June. Most likely the flight period starts in mid May at lower altitudes. In the cold spring of 1997 fully grown larvae and pupae were found in April.

Synansphecia koschwitzi Špatenka, 1992 (figs. 9, 10)

Synansphecia koschwitzi Špatenka, 1992b: 437. Type locality: Central Spain, Prov. Toledo, Aranjuez. Type material: holotype, ♂ (MWM). Laštůvka & Laštůvka, 1995: 98, fig. 63; pl. 6, fig. 7; de Freina, 1997: 175–176, figs. 165, 167; pl. 13, figs. 47–50.

Material examined. Numerous specimens from the type locality (CKS, CUK, CAK, CHR).

This species was described after a series of ♂♂ taken near Aranjuez, central Spain (Špatenka, 1992b). Later, it was reared from larvae boring in roots of a *Limonium* sp., which was identified as *L. toletanum* (Koschwitz, pers. comm., Špatenka *et al.*, 1996).

The female (fig. 10) had not yet been described or figured. It differs from the ♂ by the white subapical spot in the antenna, the smaller ETA (consisting of 5 cells, anterior and posterior cell usually covered with pale yellow to white scales), the weak PTA, the entirely white coxa of the fore leg, and the anal tuft (mixed with white dorsally).

Note. It can not be excluded that *S. koschwitzi* represents only an isolated subspecies of *S. borreyi*. However, both taxa can easily be distinguished by the shape of the ETA and the discal spot (cf. diagnosis for *S. borreyi*). It would be most interesting to study populations of *Synansphecia* spp. from southern Spain and northern Morocco living in *Limonium*. A record of *S. koschwitzi* from Malaga (de Freina, 1997) refers to *S. hispanica* sp. n., described above.

Synansphecia atlantis (Schwingenschuss, 1935) (figs. 5, 6, 7, 17c, 20)

Chamaesphecia atlantis Schwingenschuss, 1935: 106. Type locality: Morocco, High Atlas, Dj. Oucheddene, 2200 m. Type material: lectotype, ♂ (NLMW, designated by Špatenka, 1992a). Heppner & Duckworth, 1981: 35.

Synansphecia atlantis: Špatenka, 1992a, 499; Špatenka *et al.*, 1993: 102; Laštůvka & Laštůvka, 1995: 94 (part.); de Freina, 1997: 172–173 (part.).

Material examined. Paralectotype ♂ (fig. 5), with labels illustrated on fig. 6 (NLMW). Additional material from Morocco: 9♂, High Atlas, Tizi-n-Tichka, north-side, 2000 m, 14.VI.1996, leg. A. Kallies, M. Petersen & U. Koschwitz (CAK, CMP, CUK); ♂, High Atlas, Oukaimeden, 2800 m, 8.VII.1975, leg. E. Reichl (CAK); ♂, High Atlas, Oukaimeden, 2500 m, 17.VI.1994, leg C. Kassebeer (CHR); ♀, High Atlas, Oukaimeden, 2600–2700 m, 24.–30.VII.1985, W. G. Tremewan (BMNH); ♀, High Atlas, Djebel Oukaimeden, 2650–2900 m, 24.–28.VII.1985, W. G. Tremewan (BMNH); ♀, High Atlas, Djebel Oukaimeden, 2700–2850 m, 20.VII.1979, leg. H. Hepp (CHR); 38♂, 2♀, High Atlas, Oukaimeden, 2700 m, 22.VI.1998, leg. A. Lingenhöle (CAL, CAK).

This species was described after two male specimens collected in the High Atlas (Djebel Oucheddene, south of Ijoukak) at an altitude of 2200 m. Both specimens were examined by Špatenka (1992a). Later, specimens of a related species of *Synansphecia* were discovered in Spain and France. They were usually referred to *S. atlantis*. However, detailed examination of the paralectotype of *S. atlantis* revealed striking differences between the Moroccan and south-western European populations of these *Synansphecia* species, both belonging to different species groups. Therefore, it appeared necessary to redescribe *Synansphecia atlantis* and to describe the European populations as a new species, *S. hispanica* sp. n.

Description (♂ paralectotype, fig. 5). Wingspan (reconstructed) 20.0 mm; forewing length 9.0 mm; antenna 6.5 mm.

Head. Antenna black throughout; frons white mixed with leaden grey scales, scapus with white scales ventrally; labial palpus white, strongly tufted with black scales ventro-laterally, apical joint black laterally; vertex black; pericephalic hairs orange dorsally, white ventrally and laterally.

Thorax (somewhat descaled). Black dorsally; patagia black, white ventro-laterally; tegula with narrow white inner margin and white scales apically; black ventrally, with a patch of white scales below forewing.

Legs. Black; outer margin of fore coxa with a white stripe; fore tibia with white hairs dorsally; mid tibia with white tufted hairs dorsally; basal two-thirds of hind tibia with white tufted hairs; spurs black ventrally, whitish dorsally.

Abdomen. Fuscous; tergite 2 with narrow white margin posteriorly and white scales laterally (remaining parts missing).

Forewing. ETA rounded, consisting of 5 cells, only slightly broader than discal spot; posterior and anterior cell small, with single white scales at cross vein; ATA short, scaled near base; PTA short, extending to discal spot of hindwing only; apical area as broad as ETA, black with white scales between veins; veins dusted with white scales ventrally.

Hindwing. Veins black; discal spot (fig. 17c) black, triangular, extending to M_3.

Male genitalia (fig. 20). Similar to *S. borreyi*. Gnathos with crista medialis raised and strongly curved, somewhat exceeding crista lateralis proximally.

To complete a description of the male the following abdominal characteristics observed in recently collected specimens from the High Atlas are added: abdomen fuscous, with undefined white mediodorsal line, fuscous with scattered white scales ventrally, with narrow white line laterally. Tergites 2, 4 and 6 with narrow white posterior margins; sternites 3–7 with white scales at posterior margin; anal tuft fuscous, with groups of white scales laterally and ventrally.

Female (fig. 7). Wingspan 23.0 mm; body length 12.0 mm; forewing length 10.0 mm; antenna 7.0 mm. Similar to male, but differing by a small patch of white scales on the antenna dorso-subapically; inner margin of tegula yellow; metathorax with two small patches of white scales submedially; tergites with white scales medially, forming an undefined interrupted mediodorsal line; anal tuft with two tufts of white scales submedially; fore coxa white almost throughout; thorax with large yellowish white patch of scales laterally.

Variation. Only a single ♂ (paralectotype) of the original type series could be located and examined. According to Špatenka (in litt.) and to the original description both type specimens were found to be identic. Some of the subsequently collected specimens differ by the shape of the ETA (somewhat broader) and by the extension of the discal spot of the hindwing (not reaching M_3/Cu_1). In one ♀ the posterior as well as the anterior cell of the ETA is covered with scales throughout, the PTA is extremely short. Wingspan in ♂♂ ranging from 16.0–22.0 mm, in ♀♀ from 18.5–23.0 mm.

Diagnosis. This species is probably closely related to *S. muscaeformis*, but more similar to *S. koschwitzi* and *S. borreyi* (see there for diagnosis). *S. muscaeformis* can be distinguished by the discal spot of the hindwing (narrow, pointed, reaching M_3/Cu_1) and by the coloration of body and wings (with yellow scales especially in labial palpus, frons, abdomen and along margins of transparent areas).

Distribution. *Synansphecia atlantis* probably occurs over the entire range of the High Atlas. In addition to the type locality, specimens from the Tizi-n-Tichka and from Oukaimeden are known.

Habitat and bionomics. The type specimens were collected at about 2200 m at the end of June (Schwingenschuss, 1935). In mid-June 1996, M. Petersen, U. Koschwitz and the author collected a small series of specimens near the Tizi-n-Tichka in the High Atlas, at an altitude of about 2000 m. These specimens were attracted to artificial pheromones in the afternoon. The habitat was a high mountain meadow densely covered with a white flowering *Armeria* species (*A. allioides*?), common in the High Atlas. In the roots of this *Armeria* a fully grown larva was found, which unfortunately died. It is assumed that the specimens collected at that place developed in *Armeria*. Specimens were observed in similar habitats near Oukaimeden (Lingenhöle, pers. comm.). Here *S. atlantis* has been collected in *Armeria* populations at altitudes between 2500 and 2900 m from the middle of June to the end of July.

Key to the south-western Palaearctic species of the *Synansphecia muscaeformis* and *S. triannuliformis* group

1. Antenna yellow to ochreous ventrally; abdomen brown in ♂, more or less covered with yellow scales; tegula with red inner margin in ♀; legs mainly yellow ..... *S. doryliformis*
—. Antenna black, sometimes with white subapical spot in ♂, usually so in ♀; tegula with white or yellow inner margin 2
2. Anal tuft divided into 3 tufts in ♂; antenna usually without white subapical spot in ♂; PTA well developed in ♀ (Asia Minor, south eastern and central Europe to south-eastern France, host plants *Rumex* spp.) ..... *S. triannuliformis*
—. Anal tuft simple, antenna with or without whitish subapical spot in ♂; PTA developed or covered with scales in ♀ 3

3. Antenna usually with white subapical spot in both sexes (host plants *Rumex* spp., Polygonaceae) 4
—. Antenna without white subapical spot in ♂, in ♀ typically present, rarely absent; (host plants *Armeria* spp., *Limonium* spp., Plumbaginaceae) ... 6
4. Wingspan usually 14–16 mm; subapical spot of antenna undefined in ♂; PTA in both sexes covered with scales almost throughout; ETA small, usually consisting of three cells (Italy, southern France, Iberian Peninsula) ..... *S. meriaeformis*
—. Wingspan usually 18–23 mm; subapical spot of antenna well defined in ♂; PTA well developed in ♂; ETA broader, usually consisting of five cells 5
5. Coloration of abdomen and veins mainly black, vertex black, a small white spot between base of antenna and ocellus; PTA covered with scales almost throughout in ♀ (Spain and southern France) ..... *S. hispanica* sp. n.
—. Coloration of abdomen and veins mainly ochreous brown, vertex mixed with orange scales, without white spot between antenna base and ocellus; PTA small in ♀ (Morocco, Atlas Mts) ..... *S. maroccana* sp. n.
6. Ground colour yellowish brown, labial palpus, frons and margins of transparent areas of forewing with yellow scales (host plants *Armeria* spp.) ..... *S. muscaeformis*
—. Ground colour blackish grey, labial palpus, frons and margins of transparent areas of forewing with white or pale yellow scales 7
7. ETA usually twice as broad as discal spot, PTA almost reaching discal spot, discal spot of hindwing narrow, pointed; transparent areas well developed in ♀ (Morocco; host plants *Limonium* spp.) ..... *S. borreyi*
—. ETA as broad as discal spot or slightly broader, discal spot of hindwing broad and not pointed, transparent areas very small in ♀ 8
8. PTA short, usually extending to discal spot of hindwing only (Morocco, High Atlas; host plant *Armeria* sp.) ..... *S. atlantis*
—. PTA very short, usually not extending to discal spot of hindwing (Spain; host plant *Limonium* sp.) ..... *S. koschwitzi*

S. leucomelaena species group

Synansphecia leucomelaena (Zeller, 1847)

Sesia leucomelaena Zeller, 1847: 410. Type locality: Turkey, Macri (now Fethiye). Type material: lectotype ♂ (BMNH, Špatenka design., 1992a).
Chamaesphecia leucomelaena: Le Cerf, 1916: 497; Heppner & Duckworth, 1981: 36.
Synansphecia leucomelaena: Laštůvka, 1990a: 94; Špatenka, 1992a: 496; Špatenka *et al.*, 1993: 103; Laštůvka & Laštůvka, 1995: 100; de Freina, 1997: 180–182.

Material examined. Numerous specimens from southern France, southern Spain and Portugal (CFR, CAK, CJG, MWM). In addition, extensive material from Turkey and Greece has been studied.

According to Laštůvka & Laštůvka (1995), in the south-western Palaearctis this species is known from southern France, the Iberian Peninsula and Northwest Africa. Records from southern Spain and Northwest Africa should be carefully examined to exclude confusion with *S. aistleitneri.*

Synansphecia aistleitneri Špatenka, 1992 (fig. 8)

Synansphecia aistleitneri Špatenka, 1992b. Type locality: Spain, Andalusia, Prov. Granada, Sierra de Guillimona. Type material: holotype ♀ (MWM). Špatenka *et al.*, 1993: 102; Laštůvka & Laštůvka, 1995: 94, fig. 60; pl. 6, fig. 1; de Freina, 1997: 173, fig. 166; pl. 13, figs. 44–45.

Material examined. Holotypus ♀, "Hispania, Prov. Granada sept., Sra. Guillimona, 1900 m, 15. 7. 88, leg. Aistleitner, coll. Nr. 88/09a" / "*Synansphecia aistleitneri* sp. n., Holotypus ♀, K. Špatenka des. 1989".

This species was described after two specimens originating from the Sierra de Guillimona, the ♀ holotype (fig. 8) and a ♂ paratype (Špatenka, 1992b). The genitalia of the ♂ clearly prove that it forms part of the *leucomelaena* species group. However, it can not be excluded that the male paratype represents a species different from the holotype. In the past, the holotype ♀ was placed close to *S. hispanica* sp. n. (misidentified as *S. atlantis*) and the identity of both taxa has been proposed (Laštůvka & Laštůvka, 1995). Comparison of the holotype of *S. aistleitneri* with numerous female specimens of *S. hispanica* and *S. atlantis* has shown that this species is in fact different from both species. *S. aistleitneri* is associated here with the *S. leucomelaena* species group.

Differential diagnosis. Differences between the holotype ♀ of *S. aistleitneri* and ♀♀ of *S. hispanica* sp. n. (misidentified as *S. atlantis*) have been discussed by Laštůvka & Laštůvka (1995). The following points should be added: ATA in *S. aistleitneri* fairly short and broad (longer and narrower in *S. hispanica.*); PTA short in *S. aistleitneri*, but well developed (extremely narrow and covered with scales almost throughout in *hispanica*); costal margin of forewing black subapically (white in *S. hispanica*); abdomen black ventrally (brownish black in *S. hispanica*); without white line laterally (white line present in *S. hispanica*).

Distribution. Known from the type locality in southern Spain only. Male specimens resembling the paratype of *S. aistleitneri*

were also collected in different localities in the High and Middle Atlas by Petersen & Kallies in 1996, but their identity has not yet been established.

Habitat and bionomics. The type series (♂, ♀) was collected in a rocky site at 1900 m in the Sierra de Guillimona in the middle of July. Specimens from Morocco which might belong to *S. aistleitneri* were collected at altitudes between 1700 and 2200 m in June.

Note. Without the knowledge of the host plant and analysis of clearly conspecific males the exact systematic position of *S. aistleitneri* within the genus *Synansphecia* cannot be established.

Synansphecia kautzi (Reisser, 1930)

Chamaesphecia kautzi Reisser, 1930: 104. Type locality: Spain, Sierra Nevada, Monte del Lobo. Type material: lectotype ♀ (MNK, designated by Špatenka, 1992a, destroyed)

Chamaesphecia kautzi: Heppner & Duckworth, 1981: 36.

Synansphecia kautzi: Laštůvka, 1990a: 94; Špatenka, 1992a: 499; Špatenka *et al.*, 1993: 103; Laštůvka & Laštůvka, 1995: 106; de Freina, 1997: 191.

This species was previously known only after 5 female type specimens from the Sierra Nevada, Spain. Three of these, including the lectotype, were destroyed. The remaining two paralectotypes are deposited in the MNK and NHMW, respectively.

Recently a male of this species was captured near the type locality. This specimen shows strong similarities with the species of the *S. leucomelaena* group by external appearance and characteristics of the genitalia (Pühringer & Pöll, 1999). However, since the bionomics of *S. kautzi* (Reisser, 1930) are unknown, this species cannot be assigned with certainty to a species group at present.

Synansphecia affinis affinis (Staudinger, 1856)

Sesia affinis Staudinger, 1856: 278. Type locality: Bolzano (Italy). Type material: lectotype ♀ (MNHB, designated by Špatenka & Laštůvka, 1988).

Chamaesphecia affinis: Heppner & Duckworth, 1981: 34.

Synansphecia affinis: Laštůvka, 1990a: 94; Špatenka *et al.*, 1993: 102; Laštůvka & Laštůvka, 1995: 100; de Freina, 1997: 178–180.

Material examined. Extensive material from Germany, Hungary, Greece and Turkey has been investigated.

According to Laštůvka & Laštůvka (1995), in the south-western Palaearctic this species is known from southern and south-western France and from the Iberian Peninsula.

Synansphecia affinis erodiiphaga (Dumont, 1922)

Chamaesphecia erodiiphaga Dumont, 1922: 215. Type locality: Tunis (Tunisia). Type material: lectotype ♀ (NHMP, designated by Špatenka, 1992a). Heppner & Duckworth, 1981: 36.

Synansphecia affinis ssp. erodiiphaga: Špatenka, 1992a: 491; Špatenka *et al.*, 1993: 102; de Freina, 1997: 180.

Material examined. ♂, Morocco, Middle Atlas, Mischliffen crater, 1950 m, 1.VI.1984 / W. G. Tremewan, BM 1984–236 / gen. prep. by A. Kallies, gen. prep. AK87 (BMNH); ♂, Spain, Malaga, 8.VI.1994, leg. H. Riefenstahl (CHR).

So far, this subspecies had only been recorded from Tunisia. Recently, two ♂♂ from Morocco and Spain were collected. They differ from typical *S. affinis affinis* by the large ETA (consisting of 5 cells) and the wider wingspan (19–20 mm). These specimens are referred to *S. affinis erodiiphaga* here though this identification remains provisional since the larval hosts of the southern Spanish and Moroccan populations are not known.

Note. Larvae of *S. affinis erodiiphaga* were found in the roots of *Erodium arborescens* (Geraniaceae), whereas the larvae of *S. affinis affinis* live in Cistaceae species. Records of larvae from *Erodium* spp. are known only from Tunisia. The status and distribution of the subsp. *erodiiphaga* requires further attention because it may represent a species distinct from *S. affinis*.

Excluded from *Synansphecia*

Chamaesphecia powelli Le Cerf, 1916 (comb. rev.) (figs. 15, 16)

Chamaesphecia powelli Le Cerf, 1916: 15, pl. 321, fig. 4664. Type locality: Algerie, Lambese. Type material: holotype ♀ (MNHP). Heppner & Duckworth, 1981: 37.

Synansphecia powelli: Špatenka, 1992a: 490; Špatenka *et al.*, 1993: 103; de Freina, 1997; 174; pl. 13, fig. 46; pl. 20, fig. 57.

Material examined. Holotype ♀ (fig. 15), with labels illustrated on fig. 16 (NHMP); 2♀, Morocco, High Atlas, Tizi-n-Test, north side, 1900 m, reared from *Nepeta* sp. (Lamiaceae), end of June 1995 e.l., leg. Kallies & Petersen (CMP, CAK).

This species was originally described in the genus *Chamaesphecia* Spuler, 1910 and has been transferred to *Synansphecia* by Špatenka (1992a). However, a revision of the holotype revealed that it belongs in fact to *Chamaesphecia* and is closely related to *Chamaesphecia aerifrons* (Zeller, 1847) and *C. micra* Le Cerf, 1916. Both taxa, *C. powelli* and *C. micra* are likely to represent junior subjective synonyms of *C. aerifrons*. This species uses a broad range of Lamiaceae host plants (Špatenka *et al.*, 1996). Moreover, it is known to be highly variable in wingspan and in the size of the transparent areas of the forewings. However, it is refrained from formal synonymization until more material is known.

In 1996 two ♀♀ from the High Atlas were bred from roots of *Nepeta* sp. (leg. Petersen & Kallies). Both specimens agree perfectly with the holotype of *Chamaesphecia powelli* from Algeria.

Description (♀ holotype, fig. 15). Wingspan 16.0 mm; body length 9.5 mm; forewing length 7.5 mm; antenna 5.5 mm.

Head. Antenna black, scapus white ventrally; frons blackish grey, with white scales medially; labial palpus white, medial joint black distally, apical joint black laterally; vertex black with orange hair-like scales posteriorly; pericephalic hairs orange-yellow.

Thorax. Black; patagia black, orange-yellow ventro-laterally; tegula with orange-yellow inner margin; metathorax with an orange-yellow medial stripe, extending to medial stripes of equal colour on thorax and first tergites of abdomen, respectively.

Legs. Fuscous; fore coxa white, fuscous interiorly; basal half of hind tibia white laterally.

Abdomen. Fuscous, with undefined yellow line mediodorsally; tergite 1 with an orange-yellow spot medially and white laterally; tergite 2 with a few white scales posteriorly; tergites 4 and 6 with narrow white posterior margins; tergite 4 white laterally; sternites 1 and 2 with white scales medially; sternite 4 white laterally; anal tuft black, white baso-laterally and ventro-apically.

Forewing. Fuscous; ETA small, rounded, consisting of four cells, two-thirds as broad as discal spot; ATA short, slightly longer than discal spot; PTA covered with black scales throughout; apical area dark brown black, almost twice as broad as ETA, with single pale ochreous scales between veins; cilia fuscous; ventral side of same colour, but dusted with ochreous scales.

Hindwing. Veins, discal spot and outer margin fuscous; discal spot triangular, reaching M_3; cilia fuscous; similar ventrally, but costal margin and vein M_2 covered with ochreous scales throughout.

Genitalia. Not examined.

Differential diagnosis. No significant differences were found between *C. powelli, C. micra* and *C. aerifrons*. Additional extensive material is necessary to establish the relation between these taxa. *C. powelli* is also similar and related to *C. maurusia* Püngeler, 1912 and *C. anthrax* Le Cerf, 1916. From both it differs by the smaller ETA (with 4–5 cells in the species compared). From *C. anthrax* it can also be distinguished by the wider ATA and PTA. The entire group of species mentioned here should be revised in the future.

Acknowledgements

My cordial thanks are due to Dr. J. Minet (MNHP), Dr. G. S. Robinson, Mr. K. Tuck (both BMNH), and Mr. Th. Witt (MWM) for the loan of material under their care, as well as to Dr. M. Lödl (NHMW) and Mr. M. Nuß (MNHB) for arranging the loan from the NLMW and the MNHP, respectively. I would like especially to thank Prof. C. Naumann (ZFMK) for critical reading of the manuscript. I am also indebted to my friends and colleagues for giving me the possibility to study the material in their collections and for supporting information: D. Bartsch (Stuttgart, Germany), D. Baumgarten (Hamburg, Germany), E. Bettag (Dudenhofen, Germany), R. Bläsius (Eppelheim, Germany), Th. Drechsel (Neubrandenburg, Germany), J. de Freina (München, Germany), T. Garrevoet (Antwerpen, Belgium), J. Gelbrecht (Königs Wusterhausen, Germany), U. Koschwitz (Eppenbrunn, Germany), Z. Laštůvka (Brno, Czech Republic), A. Lingenhöle (Biberach, Germany), H. Löbel (Sondershausen, Germany), M. Petersen (Pfungstadt, Germany),

F. Rämisch (Berlin, Germany), H. G. Riefenstahl (Hamburg, Germany), F. Pühringer (Scharnstein, Austria), T. Sobczyk (Hoyerswerda, Germany), K. Špatenka (Prag, Czech Republic), and R. Stübinger (Hamburg, Germany).

References

Boisduval, J. B. A. D., 1840. Genera et index methodicus Europaeorum Lepidopterorum. — Paris. 238 pp.

de Freina, J., 1997. Die Bombyces und Sphinges der Westpalaearktis (Insecta, Lepidoptera). Vol. 4: Sesioidea: Sesiidae. — München. 431 S., 241 Abb., 27 (+4) Taf., ills., 126 Karten.

Dumont, C., 1922. Diagnoses de lépidoptères nouveaux du nord de l'Afrique. — *Bull.Soc.ent.Fr.* 1922: 215–220.

Esper, E. J. C., 1778–[1804]. Die Schmetterlinge in Abbildungen nach der Natur mit Beschreibungen. Vol. 2 — Erlangen: W. Walthers. 234 S., Taf. 1–36, Supplement 52 S., Taf. 37–47.

Freyer, C. F., [1831]–1858. Neuere Beiträge zur Schmetterlingskunde mit Abbildungen nach der Natur. 7 Volumes. — Augsburg, beim Verfasser; in Kommission bei der Math. Rieger'schen Buchhandl.; Himmer.

Heppner, J. B. & Duckworth, W. D., 1981. Classification of the Superfamily Sesioidea (Lepidoptera: Ditrysia). — *Smithson.Contrib.Zool.* 314: 1–144.

Laštůvka, Z., 1989. Zur Taxonomie und Morphologie von *Synansphecia muscaeformis* (Esper) (Lepidoptera, Sesiidae). — *Acta Univ.Agric.Brno* 34(4) (1986): 177–180.

Laštůvka, Z., [1990a]. Zur Taxonomie der Gattungen *Chamaesphecia* Spuler, *Synansphecia* Capuse und *Dipchasphecia* Capuse (Lepidoptera, Sesiidae). — *Acta Univ.Agric.Brno* 36(1) (1988): 93–103.

Laštůvka, Z., [1990b]. Zur Taxonomie von *Synansphecia triannuliformis* (Freyer, 1845) (Lepidoptera, Sesiidae). — *Acta Univ.Agric.Brno* 37(3–4) (1989): 129–132.

Laštůvka, Z., [1992]. Zur Systematik der Paläarktischen Gattungen der Tribus Synanthedonini, 2. Phylogenese (Lepidoptera, Sesiidae). — *Acta Univ.Agric.Brno* 38(3–4) (1990): 235–243.

Laštůvka, Z. & Laštůvka, A., 1995. An Illustrated Key to European Sesiidae (Lepidoptera). — Brno. 173 pp., 8 pls., 105 figs.

Le Cerf, F., 1916. Aegeriidae de Barbarie. *In*: Oberthür, C. Explication des planches. — *Ét.Lép.comp.* 11 (planches): 11–17, pls. 74–124.

Le Cerf, F., 1922. Aegeriidae. *In*: Oberthür, C. Les Lépidoptères du Maroc. — *Ét.Lép.comp.* 19(1): 13–403.

Pühringer, F. & Pöll, N., 1999. Das bisher unbekannte Männchen von *Synansphecia kautzi* (Reisser, 1930) (Lepidoptera, Sesiidae). — *Z.Arb Gem.öst.Ent.* 51(1–2): 1–8.

Reisser, H., 1930. Eine neue europäische Sesiide. — *Z.öst.Ent Ver.* 15(11): 101–104, Taf. 13.

Schwingenschuss, L., 1935. Aegeriidae. *In*: Zerny, H. Die Lepidopterenfauna

des Großen Atlas und seiner Randgebiete. — *Mem.Soc.Sci.Nat.Maroc* 42: 1–163.

Špatenka, K., 1992a. Contribution a la stabilisation de la taxinomie des Sesiides paléarctiques (Lepidoptera, Sesiidae). — *Alexanor* 17: 479–503.

Špatenka, K., 1992b. Weitere neue paläarktische Sesiiden (Lepidoptera, Sesiidae). — *Alexanor* 17: 427–446.

Špatenka, K. & Laštůvka, Z., 1988. Typen der Glasflügler der Staudinger- und Püngeler-Sammlung im Zoologischen Museum Berlin. — *Dt.ent.Z.*, N. F. 35: 331–339.

Špatenka, K., Laštůvka, Z., Gorbunov, O., Tosevski, I. & Arita, Y., 1993. Die Systematik und Synonymie der palaearktischen Glasflügler-Arten (Lepidoptera, Sesiidae). — *Nachr.ent.Ver. Apollo*, N.F. 14: 81–114.

Špatenka, K., Gorbunov, O., Laštůvka, Z., Tosevski, I. & Arita, Y., 1996. Die Futterpflanzen der paläarktischen Glasflügler (Lepidoptera, Sesiidae). — *Nachr.ent.Ver. Apollo*, N.F. 17: 1–20.

Staudinger, O., 1856. Beitrag zur Feststellung der bisher bekannten Sesien-Arten Europa's und des angrenzenden Asien's.- *Stettin.ent.Ztg* 17: 193–224, 257–288, 323–338.

Zeller, P. C., 1847. Verzeichniß der vom Professor Dr. Loew in der Türkey und Asien gesammelten Lepidoptera. — *Isis* (*von Oken*) Jena 1847(1): 3–39.